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Volume 8 Number 1

June 1999

NEWSLETTER OF THE AUSTRALIAN NETWORK FOR PLANT CONSERVATION INC.

## Conservation of non-vascular plants in semi-arid landscapes

*David Eldridge, Centre for Natural Resources, Department of Land and Water Conservation*

### Introduction

Non-vascular plants are common components of semi-arid and arid landscapes where they often form a crust on the soil called a biological or cryptogamic crust. The distribution of non-vascular plants and the crusts they form results from a complex interaction between environmental factors and management practices. At a continental scale, the distribution of these organisms is related to rainfall and soil chemistry (particularly pH). At a microsite scale, non-vascular plants are strongly related to vegetation cover, physical and chemical properties of the soil, and microrelief.

Because of their close association with the soil surface, non-vascular plants and their crusts play a vital role in soil and ecosystem processes. They stabilise the soil against both water

and wind erosion, regulate the flow of water into soils, and organisms in the crust produce nitrogen and organic carbon which is used by vascular plants. Non-vascular plants also provide favourable sites for the establishment and survival of vascular plant seedlings and provide a refuge for soil invertebrates, which are important for decomposition and mineralisation processes.

### *What do we know about the distribution of non-vascular plants?*

Despite the importance of non-vascular plants, we know relatively little about where they are found and even less about their conservation status. Our knowledge about their conservation status is often complicated by the fact that they vary enormously over small areas. For example, some organisms may be common under shrubs but absent out in the open.

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### ANPC Inc. Mission Statement

*"To promote and develop plant conservation in Australia."*

### *Danthonia*

*Danthonia* is produced by the Australian Network for Plant Conservation Inc. and published with assistance from the Australian National Botanic Gardens.

*Danthonia* is printed on 100% recycled paper.

ISSN 1039-6500

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### Next Deadline

We welcome articles and information from members. It's a great way for us to keep in touch and to tell others about the work that's going on out there. So please send articles in and keep the networking going! Deadline for the September 1999 issue of the newsletter is 13 August 1999.

### Article Format

Please send typed or handwritten articles, no more than two A4 pages, to Jean-Marc Porigneaux by fax, mail, email, or diskette. If sending by email, please send in the body of the text or as an attachment in Word 6 or Rich Text Format (rtf) to: [anpc@anbg.gov.au](mailto:anpc@anbg.gov.au). Illustrations and logos are always needed too, in the form of clear prints, slides or drawings.

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## National Coordinator's Report

Jeanette Mill

The ANPC has moved to a new office, still located at the Australian National Botanic Gardens (ANBG). It is a larger office, with plenty of space. All our contact details remain the same, except the fax number, which is now 02 6250 9528. We are located in the Ellis Rowan building near the cafe. Feel free to pop in as we would be happy to see you.

We have been fortunate to receive some additional staffing support from the ANBG until the end of June, and Jean-Marc and I have been joined by Fiona Hall. Fiona has a background in conservation work in the UK, and is enjoying becoming familiar with the scene in Australia. Fiona is undertaking editorial and promotional work, and is also scoping a series of master workshops in plant conservation techniques. Welcome Fiona! And thank you to the ANBG.

The full ANPC Committee has met for the first time, and there is a report from the Secretary in this issue.

### Conference

Conference organisation is stepping up, and thanks to generous support from Kings Park and Botanic Garden, we have been able to produce a colour brochure and poster for the conference this year. If you would like additional promotional materials to distribute, please contact the National Office. It will assist ANPC greatly with achieving our mission and objectives, and also with fundraising, if we have a good attendance at the conference. So here is your chance to help by advertising the conference in your organisation's newsletter, by electronic mail, and/or by making a link to our website (<http://www.anbg.gov.au/anpc>). Also, the greater the attendance, the more the costs can be kept down. The Network needs your support.

We are planning to have trade displays at the conference, so if you are interested in promoting your products or services, contact the National Office for details.

### Curators Forum

*The Path Ahead* was the title of the recent Curators Forum, hosted by the Royal Botanic Gardens, Melbourne, from 12–14 April. ANPC

was invited to present a paper and convene a working group meeting on conservation collections at the Forum. The range of papers at the forum included Ecology, Botanic Gardens and The Australian Research Centre for Urban Ecology (ARCUE); Building Community Connections; 2000 Olympics — Impacts on RBG Sydney; and Masterplanning/Zoos for the Future.

The ANPC's role in coordinating conservation collections, providing training in conservation techniques and promoting best practice, was considered essential in discussion about future roles for botanic gardens in conservation. An interesting observation from the outcomes of the Working Group is that discussion moved from conservation collections to the role of botanic gardens in biodiversity conservation, with recommendations coming from the session reflecting this. **The main recommendation was that the Council of Heads of Australian Botanic Gardens (CHABG) endorse and support the development of a national strategy which defines the role and contribution of botanic gardens in biodiversity conservation.**

The strategy will be drafted by a working group of curators representing all states and the ANPC.

Key principles:

- Adopt a collaborative approach which integrates all key organisations involved in plant conservation.
- Be guided by the Botanic Gardens Conservation International (BGCI) International Agenda for Botanic Gardens in Conservation (currently under review).
- Establish National, State and Regional Priorities.
- Consideration of ecological processes and communities in which individual species exist or are threatened.

On the third day of the Forum, after a tour of RBG Cranbourne, a joint meeting was held between the Curators Forum and CHABG. Frank Howarth, Director of RBG Sydney, presented a discussion paper entitled *Towards a More Effective National Organisation for Botanic Gardens and Like Minded People: Good, Bad or Indifferent?* As annual Curators Forums have now been held for three consecutive years, it was felt timely to discuss the need for a more formal organisation to serve the needs of botanic gardens in Australia. The roles of existing

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organisations and fora such as CHABG, the Council of Heads of Australian Herbaria (CHAH), the Curators Forum and ANPC were discussed. The group agreed that the creation of a new organisation was not required, but that a Botanic Gardens conference in the year 2001 would be scoped.

### Donations

Thanks again to all those who have made donations to the ANPC — your support is greatly appreciated.

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Some species are widespread simply because they have the ability to exploit a wide range of environments. Some species produce a large number of propagules or spores, are able to reproduce both sexually and asexually, and have a range of morphology (body types) which allow them to survive in a diverse variety of landscapes. Examples of these are the mosses *Bryum argenteum*, *B. pachytheca* and *Funaria hygrometrica*, and the lichens *Collema coccophorum* and *Peltula* spp.

Other species are restricted to certain environments which offer refuge during unfavourable times (usually drought). In arid areas, liverworts such as *Plagiochasma rupestre* and *Asterella drummondii* are often restricted to rocky overhangs where water collects. Others such as the lichen *Lecidea* spp. are associated with compacted soils, for example along track edges. The lichens *Thysanothecium hookeri*, *Xanthoparmelia eilifii* and *Siphula coriacea*, whilst being locally rare, have a widespread distribution. Thus, if an area is being sampled for non-vascular plants, many of the organisms will be missed unless we know those parts of the landscape they are likely to be found in. An example is the lichen *Paraporpidia glauca*. It is commonly found on compacted termite pavement surfaces in dry areas but is relatively rare in other locations.

Some species are regionally uncommon or rare. The moss *Trichostomum brachydontium*, although reported as rare or uncommon in South Australia, is widely distributed in eastern Australia. Others such as *Bryobartramia novae-valesiae* are regionally rare.

### Influences of management on the distribution of non-vascular plants

While our knowledge of the conservation status of non-vascular plants is limited, a number of studies at a range of scales enable us to make some broad generalisations about the distribution and likely conservation status of non-vascular plants.

A study commenced recently to examine the distribution of non-vascular plants inside and outside a number of exclosures in western NSW. Preliminary results have indicated that species such as the lichens *Acarospora reagens*, *Caloplaca* spp. and *Xanthoparmelia* spp. are more common inside exclosures where disturbance is minimal compared with adjacent disturbed surfaces. These studies suggest that some species of non-vascular plants may be susceptible to disturbance by grazing and/or fire.



Non-vascular plants come alive under the microscope.  
Photo by David Eldridge.

Grazing gradient studies conducted at varying distances from watering points in western Queensland and western NSW have indicated strong trends in cover and abundance of non-vascular plants in relation to grazing intensity. Whilst some species are eliminated by trampling, other 'pioneering' species occur irrespective of the level of disturbance. At Kidman Springs in the Northern Territory, maximum diversity of the liverwort *Riccia macrospora* occurred in areas furthest from water, or inside exclosures where grazing was removed. These results, although not species specific, provide strong evidence that the diversity of non-vascular plants, like vascular plants, is strongly influenced by disturbances such as grazing and fire. These and other studies suggest that increasing land degradation is likely



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A rich suite of non-vascular plants in a sheltered spot west of the ranges. Photo by Heino Lepp.

to result in changes, such as a loss of species diversity and the retreat of grazing-intolerant species to refuges. They also suggest that some species or taxa may be sensitive indicators of landscape stability.

Studies conducted at the landscape scale, for example the semi-arid mulga (*Acacia aneura*) woodlands in western NSW, have stressed the importance of patchiness for creating microsites for non-vascular plants. Bryophytes tended to occur under trees in areas receiving water and nutrients, whilst lichens tended to occur in the bare intervening areas where water runs off. These functioning, patterned landscapes provide a range of habitats for a variety of organisms with preferences for certain niches. Land degradation, principally overgrazing, results in a homogenisation of the soil surface, a decline in species richness, and dominance of the flora by a few weedy pioneering species such as the lichens *Peltula patellata* and *Collema coccophorum* and the moss *Bryum pachytheca*. These species generally replace the functionally more complex foliose (leafy) and fruticose (shrubby) lichens which require stable surfaces on which to survive.

Broad regional studies have generally been lacking when it comes to studies of non-vascular plants. In a general sense, cover and floristics generally declines with decreasing rainfall and increasing summer rainfall. Bryophytes (mosses and liverworts) replace lichens in areas of increasing summer rainfall, and cyanobacteria make up a larger proportion of the soil community as one moves from temperate to subtropical rangelands.

### Where to from here?

As non-vascular plants are small and often susceptible to trampling, disturbance and fire, they play substantial roles as early warning signs of changes in ecosystem health. Their value as bio-indicators lies in the fact that they are often present when much of the vascular plant flora has been removed by grazing or drought. These organisms are so important that their presence is used as a measure of landscape health in dry areas.

The conservation status of non-vascular plants in Australia is difficult to assess, given the paucity of studies on them. Many non-vascular organisms are small, cryptic, poorly developed and often infertile in dry areas due to the harsh and unpredictable climate experiences in semi-arid regions. Their small size means that a microscope is often required for identification to species level. Despite these problems some techniques have been developed to enable non-specialists to identify non-vascular plants at least to the level of morphological groups. These morphological groups convey an image of the effectiveness with which these organisms facilitate ecological processes, and their ability to recover from disturbance.

The first step in understanding non-vascular plants is to include them in inventories along with vascular plants. A national inventory is needed so that we can begin to build up a database of where the organisms occur, and the likely impacts of management practices upon them.

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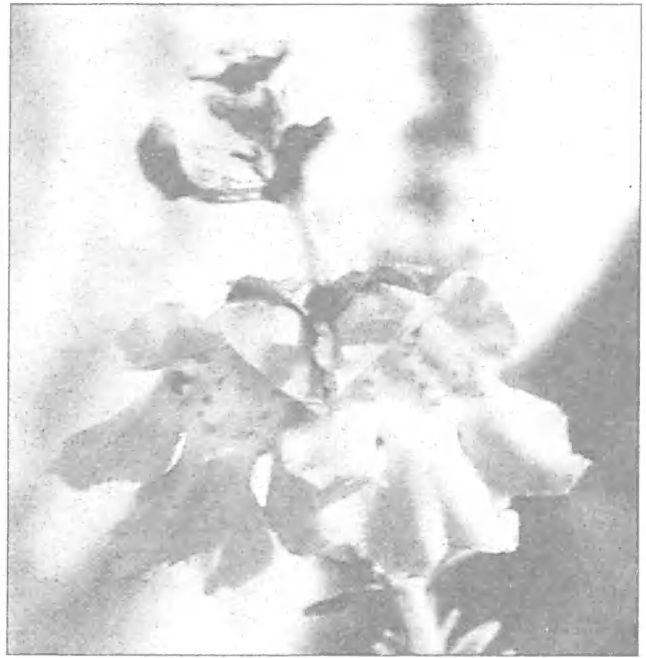
## Conserving *Prostanthera eurybioides* (Monarto Mintbush)

John Boland and Chris Bryant, landholders,  
Monarto, SA

In the early 1980s we had been helping the village community revegetate some rural land at Kuitpo, south of Adelaide. This spurred us on to considering buying some rural land ourselves to revegetate with both aesthetic and potentially commercial plants. We were appalled with the extent of clearance in South Australia and wanted to do our bit to redress this problem. Obviously we would also have a place to go to get out of the city at times.

We looked at a couple of places which didn't suit and then one Saturday there was an inconspicuous advertisement for a 50 hectare block of land in the semi-arid country (350 mm rainfall) near Murray Bridge. We always remember that one of the selling points was "some trees", which turned out to be a massive understatement. We thought it would be nice to go for a Sunday outing anyway. We went there and one-third of the block had never been cleared and there had also been plantings of 3000–4000 trees for the proposed new city of Monarto which didn't eventuate. We fell in love with the place straight away and the news from the previous owner that a small section had a Heritage Agreement on it, because there was an extremely rare plant in it, enhanced our enthusiasm.

There had been a fire through this section a couple of years before we bought the land, so we didn't hold much hope for the rare plant as the previous owner said "a couple of these plants were left". We got busy growing trees and making the usual beginners' mistakes of putting in introduced species (in this case West Australian gums and wattles). As time went on, we started collecting seeds of local species which really saved us in terms of plant survival and interested us in what were the original plants of the area. We constantly searched for the rare plant, and then after three years of owning the place, we took into the Botanic Gardens what we thought was the right specimen. After waiting for sometime in the lobby, out came a very excited guy demanding to know where we had got this specimen and did we know that it was *Prostanthera eurybioides*. Of course we had been pretty sure it was, but we didn't want to



*Prostanthera eurybioides* flower from a plant on display at Monarto Zoological Park. Photo by Jeanette Mill.

influence his opinion and also we felt like having a bit of fun by playing dumb.

That following spring we realised we had quite a number of plants now that we knew to look for the bright blue when flowering. We began to have quite close contact with Black Hill Flora Centre (BHFC) who told us how to mark each plant with a colourful plastic golf-tee. Our family undertook a count in 1995 and we were thrilled to report to BHFC that we had 177 plants! Interestingly, before the fire in the 1980s a survey had been done when the Heritage Agreement was being set in place and the number of plants counted was 23.

The BHFC became involved with collecting seeds, trialing different planting methods, establishing survey sites, etc. They would bring students and visitors out and they even spotted the odd marijuana plant that had a short life there. We were given a large number of *P. eurybioides* plants established by the Centre over a number of years, and at a rough estimation about 60% of those have survived. In our plantings of these supplied seedlings we have been conducting little experiments. We thought that since the plant exists only in two populations of any size (ours and at Mt. Monster Conservation Park in the south-east of South Australia) plus some scattered plants, perhaps the accepted wisdom about the prime conditions for it might be questionable. It is surmised that for survival that it should be on granite



A translocated *Prostanthera eurybioides* at John Boland's and Chris Bryant's property. Photo by Jeanette Mill.

outcrops, in amongst melaleucas or some such cover, and probably not on exposed northern aspects. A large number of extant plants on our property already defy one of these — they grow on a very exposed northerly facing slope. So we have tried to cover many other possibilities in our plantings, including in sandy soil in open woodland, on exposed areas but on rocky outcrops and in scrub but on sandy soil. The survival rates at first glance don't seem to differ much, but in some of those trials only low numbers have been involved so we will have to continue to monitor future plantings. This coming spring we will be undertaking another survey with the assistance of the Centre.

We now have all our original bush patches under permanent Heritage Agreement. The entire 50 hectares has not had any stock on it for over 15 years (except for the occasional invader). With the assistance of BHFC we feel we are contributing towards helping bring *P. eurybioides*

back from near extinction. As well it has been great fun showing our friends what can be done to conserve this plant.

One other good thing about this is that it fits in with our overall management plan for the property. We view it as a conservation zone and our role is to manage it with that primary purpose in mind. We have planted over 6000 seedlings over the 15 years we have had it (now almost totally local species as alluded to above). We do also have an orchard area (with hardy fruit and nut trees) and some of the natives are being grown for timber. As well as the Mintbush, we have been spreading another rare plant that exists on our property, *Acacia menzelii*. Menzel's Wattle is much less threatened but still in need of attention. One of the exciting things is that it would seem that before the stock were removed in the 1970s only a couple of old specimens were on the property. We deduce this since most of the naturally occurring specimens are relatively young (and some only seedlings) and probably only survived because there was no stock to nibble them. There are about 100 naturally occurring plants and we have planted out about 40 more that we have grown from seed.

Even more satisfying in some respects is the general level of natural regeneration that is occurring. Another rare plant, *Acacia rhigiophylla* (Monarto Wattle), is spreading slowly on its own. The Southern Cypress Pine, *Callitris preisseii*, was down to a single specimen on our property before the Monarto Development Commission planted out a few hundred. These Pines had been prolific in this area before they were cut for fence posts since they are white-ant resistant. Now, through natural regeneration, there would be upwards of ten thousand young trees on the block. The scrub is also spreading and there is filling in of the Monarto plantings by saltbush, wattle, native apricot and so on. We have very few rabbits left around the area — we have been warren-ripping for years with good effect. They still used to come in from surrounding properties but that has slowed with the advent of Calici. It is a very exciting place to go to and have a walk around or spend a few days.

## Research and management of urban bushland by Kings Park

*Ray Wills, Kings Park & Botanic Garden, Perth,  
Western Australia*

*Dr Ray Wills is Senior Ecologist with the Kings Park and Botanic Garden. He leads a group of research scientists and students on*

*projects aimed at providing information for the ecologically-based management of the urban bushland managed by Kings Park. He is also currently the Hon. Secretary for the Ecological Society of Australia — the peak group of ecologists in Australia.*



### *Introduction*

Traditionally, bushland management has been undertaken with minimal information, often without a basic understanding of the needs of the species of plants and animals being managed. Kings Park & Botanic Garden has identified key programs for bushland research and management, ranked in priority of the perceived importance for achieving the agencies bushland goals. These programs are risk management, conservation, interpretation, recreation, environmental weeds, feral animals, rehabilitation, and re-introduction. These programs will dramatically improve the approach to management, providing information that is fundamental to gaining an understanding of the plants, animals and other biota of the bushland, and will enable 'best practice' management.

The bushland of Kings Park and Botanic Garden is a highly valued heritage asset uniquely placed on the doorstep of Perth's central business district. The bushland was effectively reserved for public purposes from the outset of the Swan River Colony. Half the present bushland was formally included in a reserve by Governor Weld in 1872, with the remaining half added in 1890 under John Forrest's colonial administration. It was declared an 'A-class' reserve in 1900.

Management of Kings Park bushland has varied according to the values and perceptions of the day. For example, logging of Jarrah was extensive using convict labour in the 1860s, while

major planting of the bushland with exotic species continued well into the present century. Incremental removal of bushland for public recreation facilities reached its zenith in the 1960s.

### *Research*

Kings Park & Botanic Garden undertakes scientific research in the fields of conservation biology, genetics, restoration ecology, germplasm conservation and propagation science. These five disciplines underpin the integrated approach used in providing focused and practical methods in bushland management and restoration, rare flora conservation and horticultural development of Western Australian plants.

The science group, led by Dr Kingsley Dixon, has developed a significant niche in conservation research with a unique melding of strategic and practical research, strengthened through its strong association with all universities in Western Australia, including The University of Western Australia where the laboratory has a formal link through its Adjunct Department status. The raft of research capabilities developed by the Kings Park & Botanic Garden laboratory represents one of the only facilities of its type in botanical research in Australia.

The success of the laboratory is reflected in the growing number of research projects, climbing from 26 project areas in 1996/97 to 49 research initiatives in 1997/98. Currently the laboratory has forty five funded positions — only six of these are government funded, the remainder comprising externally funded staff and students. Training and development remains a major emphasis of the Division with nine honours students and twenty PhD students based at Kings Park.

Kings Park & Botanic Garden have a range of research projects operating to deliver information for the management of Kings Park & Botanic Garden bushland. This includes a range of coordinated projects examining ecosystem dynamics and bushland restoration.

### *Assessing the impact of fire on ecosystems (Dr Ray Wills, project leader)*

Fire results in 'biomass reduction' — the removal of both dead and living plants (and animals) from ecosystems, and clearly signals significant ecological changes. While Australian ecosystems can regenerate after fire, too-frequent



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fire is likely to impact on the health of ecosystems in Kings Park & Botanic Garden. A series of projects have been initiated in 1997/98 to investigate the effects of differing frequencies of fire on various environmental elements in Kings Park.

While there have been many studies on single fires in Australia, very few have looked at fire frequency, and none have considered a broad range of factors in a single case study. This study brings a team of researchers to examine the effect of fire frequency on soils, plants, animals, and fungi. The information must be provided to allow managers to prevent the loss of species and to adequately manage the health of single trees and of whole ecosystems.

'Fuel reduction' burning programs rotating on a prescriptive standard do not take into account habitat variation. If the management is to reduce wildfire without taking into account ecosystem requirements, fine. But if conservation is an aim of management, fire regimes should be applied on an ecosystem by ecosystem basis, not on broad, general prescriptions. Furthermore, arguments that burning on a 'natural rotation' or 'aboriginal burning practices' is also flawed — the ecosystems we manage today are different to those that were once exposed to 'natural' or 'aboriginal burning'. Expertise in current management techniques should not be confused with expertise in appropriate management!

#### *Managing fungi in ecosystems (Dr Ray Wills, project leader)*

Fungi have an important but little studied role in the function of ecosystems. Fungi contribute to the health of the bushland ecosystem by capturing, storing, releasing and recycling essential nutrients. Some of the major roles of fungi include: (a) mutually beneficial relationships (mycorrhizas) with trees and other plants; (b) decomposition of organic matter and releasing mineral nutrients; (c) attacking living plants or producing wood rots.

Collaborative research by Dr Neale Bougher, CSIRO Forestry and Forest Products, and Kings Park and Botanic Garden on the biodiversity and ecology of fungi in Kings Park has identified many species of fungi not previously recorded in the Park. Indeed some have never been recorded before anywhere in Western Australia. Kings Park and Botanic Garden in Perth is an

important bushland refuge for many fungi and over 100 species had been recorded in the Park.

The diversity of fungi in Kings Park is significant because unique physiological attributes of each fungal species probably help perpetuate the woodland, as well as aid its recovery in the face of environmental perturbations. The biodiversity of fungi at Kings Park, their specific roles, and the potential uses of fungi in restoration of bushland plant communities have yet to be fully assessed.

These initial operational works will focus on priority weed removal, slope stabilisation and public safety works and revegetation of key areas.

#### *Alcoa Jarrah-Tuart Restoration Project (Dr Ian McLean, project leader)*

Dr McLean has recently joined Kings Park & Botanic Garden to take over this project from Dr Colin Yates, the previous project leader. It is generally thought that at the time of European settlement Kings Park was a Eucalypt-Banksia-Sheoak forest variously dominated by Tuart (*Eucalyptus gomphocephala*), Jarrah (*Eucalyptus marginata*) and Marri (*Corymbia calophylla*). Since settlement the Kings Park bushland has been subjected to a wide range of disturbances including selective logging of Jarrah, repeated cool fires and controlled burning, frequent summer wildfires, livestock grazing, 'beautification', introductions of exotic species, and increasing fragmentation and isolation. There is anecdotal, historical and some scientific evidence to suggest that disturbance has led to a change in the composition and structure of the trees of the bushland, with Jarrah and Tuart declining in abundance and sheoak and introduced eastern Australian species of Sugar Gum (*Eucalyptus cladocalyx*), Bangalay (*Eucalyptus botryoides*), Lemon Scented Gum (*Corymbia citriodora*) and Kurrajong (*Brachycton populneus*) increasing in abundance.

Dr Yates has already mapped the current distribution of Tuart and Jarrah in Kings Park, and documented historical changes to their distribution. The project is also investigating the population processes underlying the decline of the trees, and invasion of the introduced tree species. Thirdly, the project is developing techniques for increasing the abundance of Tuart and Jarrah and reducing the abundance of invasive species.

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## Fourth Australian Network for Plant Conservation National Conference and Annual General Meeting

*Promotion, Practice and Partnerships*

Dates: 25–29 November 1999

Location: Lake Hume Resort, Albury/Wodonga, Australia.

### Themes:

Conservation and restoration of ecological communities  
Regional conservation — an ANPC regional plant conservation strategy?  
In situ conservation  
Education — does ANPC need an education strategy?  
Integration of plant and animal conservation  
Conservation of non-vascular plants  
Conservation policy

### Abstracts:

Abstracts from Australia and the surrounding region are invited.

If you are interested in presenting a paper, poster, workshop, practical workshop or field trip, please send an abstract of no more than 250 words by **July 31, 1999**. Please also include full contact details.

Submit abstracts in Word 6 or Rich Text Format, electronically if possible, as an email attachment or on diskette. Otherwise send by fax or post.

Please direct abstracts to:  
ANPC National Office  
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Ph: 02 62 509 509, Fax: 02 62 509 528,  
email: [anpc@anbg.gov.au](mailto:anpc@anbg.gov.au)

Registration enquiries to:  
Bradley Hayden, Ph: 02 6040 1064

**For more information:** Check the ANPC website at <http://www.anbg.gov.au/anpc/4thconf.html>

### Call for Volunteers

Volunteers play a vital role in keeping the ANPC a thriving organisation. We are currently seeking one or two people to process memberships, with scope for further activities such as membership drives and fundraising, depending on skills and enthusiasm. The ANPC National Office is located within the picturesque Australian National Botanic Gardens in Canberra. Volunteers will receive free ANPC membership and a free parking permit for ANBG. If you have the time to help out on a regular basis, then please contact us on (02) 62 509 509.

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Dr Yates studies describing the pattern and processes underlying the invasion of the Kings Park bushland by introduced trees Sugar Gum (*Eucalyptus cladocalyx*), Bangalay (*Eucalyptus botryoides*), Lemon Scented Gum (*Corymbia citriodora*) and Kurrajong (*Brachychiton populneus*) have been completed. The studies found that each species recruited large numbers of seedlings following the 1989 and 1996 fires, and indicates that the process of invasion is facilitated by fire. This information will be used to provide informed management of the bushland.

This project has initiated the first scientific investigation of the pollination ecology of Jarrah. The study found that Jarrah was a mass flowering generalist in its pollination relationships, attracting a diverse array of

animals including insects and birds. Insects were overwhelmingly the most commonly observed floral visitor; 83 insect species from 65 genera in 39 families were observed visiting Jarrah flowers. This diversity is higher than that reported in a limited number of studies for other species of eucalypt and was surprising given that Kings Park is an urban remnant in the centre of the metropolitan area and isolated since the turn of the century. The study supports the view that urban bushland remnants such as Kings Park are significant for biodiversity conservation despite their isolation and small size.

Dr Wills can be contacted by email at:  
[rayw@kpbg.wa.gov.au](mailto:rayw@kpbg.wa.gov.au)

## Book Review

by Ros Cornish, landholder, Bungendore, NSW

*Grassland Flora: a field guide for the Southern Tablelands (NSW & ACT)*. 1998. David Eddy, Dave Mallinson, Rainer Rehwinkel, Sarah Sharp. ISBN 0 7313 6021 4; RRP \$15

You can judge this book by its cover. I am not trying to be flippant, but a friend of mine was looking for his copy and found it in his backpack, inside a plastic bag with a used tea bag. It had been there for several days and was none the worse for such treatment. I too have noticed the robustness of **Grassland Flora** as my copy still looks pristine after several long walks, clutched in a sweaty hand. Its compact size, matt finish, sturdy spiral binding and easily flipped pages will allow it to stand up to a lot of rough treatment and will ensure that it is used as intended — as a field guide.

A lot of thought has been put into the production of **Grassland Flora**. It is a high quality publication set out in a logical way and includes the maximum amount of information in a small space. Every word has been thought about and this has resulted in a very succinct, informative book. It has a total of 157 pages, including a short glossary on the inside back cover. It should be noted that the shortness of the glossary is in keeping with the authors' statements that no previous botanical knowledge is required and that botanical terms have been avoided where possible.

The bulk of the book — 139 pages — is plant descriptions, photographs (all colour) and drawings. In a field guide it is tempting to overlook the first few pages in your eagerness to start identifying plants but in this case you would miss out on important and interesting information. There is a short introduction of two pages which states the aim of the field guide, the region it covers — the Southern Tablelands of NSW and ACT — and explains what grassy ecosystems are and why they are important. There is a full page map of the region covered and several good, explanatory photographs supporting the text. This is followed by a short section on threatened plants and communities and explains the current position of these under ACT and NSW legislation. A table lists the grassy ecosystems and associated plant species listed as threatened in the Southern Tablelands of NSW and ACT. An important point is made that a

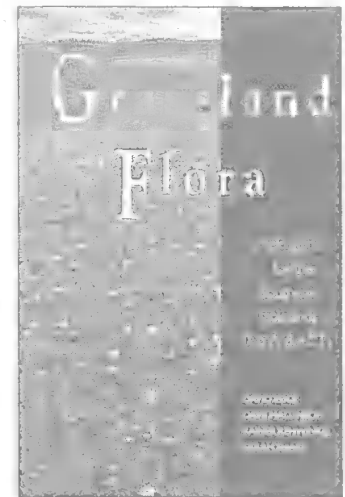
permit is required for collection of listed species from wild populations, even from private land.

Two pages describe the animals in grassy ecosystems, again accompanied by good photographs and a drawing. This is followed by a section on management of grassy ecosystems in the Southern

Tablelands and describes the current land uses and management practices. It goes on to cover conservation management objectives and finishes with the concept of 'adaptive management', which is being encouraged by conservation agencies in the Southern Tablelands, and what it involves.

The page on how to use the field guide is important to read if you are to get the most out of the book. The authors point out that not all of the plant species (native and exotic) likely to be seen in the Southern Tablelands grassy ecosystems are covered as this would mean describing over 500 species. A quick count though indicates that they have described about 250 plants to species level and, in the case of some grasses, have referred to an additional 30 or more. At first I was disappointed to find that for some of the grasses, such as Wallaby Grasses (*Austrodanthonia* spp.) and Plumegrasses (*Dichelachne* spp.), only one page is allotted to their description and individual species are not differentiated. However, after trying to identify such grasses to species myself recently, I realise that it is difficult to do without significant magnification of flower parts and cannot be done 'in the field'. The audience at which the field guide is aimed should not be expecting such detail.

The plants have been grouped, sensibly, according to life form into the sections grasses, rushes and sedges, lilies, orchids, forbs, ferns, and shrubs and trees. Obvious labels are on the left hand side of each page so it is easy to see which section you are in. Within the sections though it can be tricky finding the plant you want. Having made the decision that no previous botanical knowledge is required to use the field guide, the order in which to place the plants



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(continued from page 11)

becomes a problem. We are told that the forbs are grouped by similarity of flower colour, foliage and habit. However, the yellow form of Hoary Sunray (*Leucochrysum albicans*) and the Yellow Burr Daisy (*Calotis lappulaceae*) appear in the white and purple sections respectively rather than in the yellow section, presumably because species in the same genus have been kept together. We are not told how the other sections are arranged. The sections other than grasses are small enough that this doesn't matter, but with the grasses there are 37 pages to flip through. The grasses seem to have been arranged by degree of commonness, with the most common — Kangaroo Grass (*Themeda australis*) — first. This has led to the apparent anomaly of having one page on Speargrasses (*Austrostipa* spp.) then 22 pages further on, half a page on Brushtail Speargrass (*Austrostipa densiflora*). Thankfully, the book has been designed to flip through easily and the photographs are good enough for quick recognition.

The information given on each species is comprehensive. In keeping with the audience at which the book is aimed, common names take prominence, but genus and species names as well as synonyms and the family name are also given some prominence. One very good feature of **Grassland Flora** is that it includes exotic herbaceous species (indicated by \* at the beginning of the genus name). A fellow user of the field guide is very pleased with this as, for the first time, he has been able to identify all the grasses on his acreage at least to genus level, and now knows which are exotic. Prominent colour-coded letters indicate whether a plant is (A) annual, (E) exotic, (N) noxious or (T) threatened.

The description for each species not only covers the usual botanical features but also lists any characteristics that the authors find useful to differentiate species in the field. Details of status and distribution are given — that is, how common it is, how widespread and where in the region it is found. In some cases there are notes on any information of interest about a species, for example, whether it would be useful in landscape horticulture or make a good garden specimen. In most cases there is a section on similar species and how to distinguish between them. For the grasses, there is an additional section on management which provides useful information on such things as the effects of grazing or raising soil fertility. A friend commented favourably on

this as, after identifying his grasses, he also had the information about how they would cope with grazing and whether they tolerated fertilising. He was also interested to find that the Sharp Rush (*\*Juncus acutus*) is an indicator of high salinity.

The text entries for species are on the left hand pages. Photographs and drawings are on the right hand pages. In the majority of cases the photographs are excellent and often show the form of the plant as well as close up detail of flowers, making identification easier. There are also long distance shots of some of the grass communities. There are a number of very good line drawings, which usually highlight particular parts of a plant and aid in identification. The drawings in the forbs section do not have a scale but most seem to be 1:1.

After the plant descriptions is a page of references and a list of suggestions for further reading, followed by the index. The index is very good with \* indicating exotic species and scientific names italicised. All the common names and synonyms are also listed. Finally, there is a section explaining terms used in the book. This is separate from the glossary and provides detail on such terms as 'Threatened species' and 'Life form'. I had difficulty though finding a definition of 'noxious species' as it is within the explanation of 'Species origin' then within a sub-point on 'Weeds'. The glossary is confined to short definitions of botanical terms such as 'auricle', 'corona', 'spikelet' used in the plant descriptions.

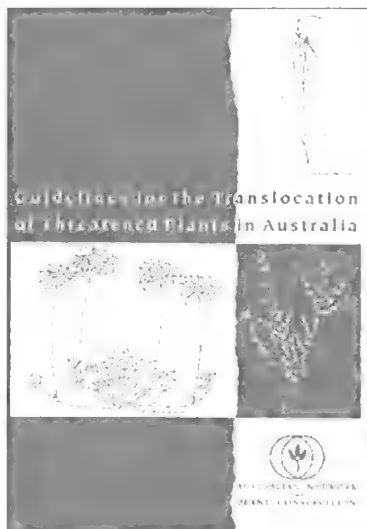
Funding for the production of **Grassland Flora** was provided jointly by Environment ACT, NSW National Parks and Wildlife Service Southern Zone Threatened Species Unit, NSW Department of Land and Water Conservation, World Wide Fund for Nature — and also by the Snowy Mountains Hydro-Electric Authority.

I have no hesitation in recommending **Grassland Flora** to people in the Southern Tablelands who are interested in identifying plants in grasslands. At the very modest recommended retail price of \$15, it would be a worthwhile purchase for anyone visiting the Southern Tablelands who is interested in grasslands.

I would like to thank Lynton Bond, Barrie Hadlow, Merren Sloane and John Wilkes for their comments on the book.



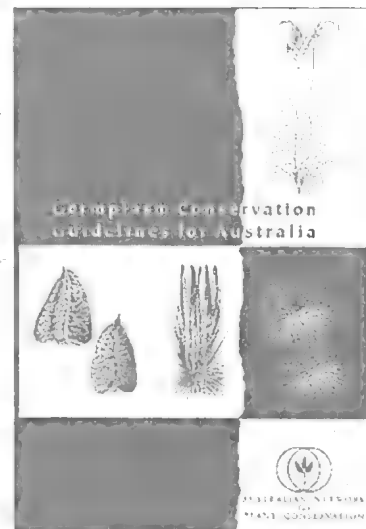
## Guidelines for Germplasm Conservation and the Translocation of Threatened Species



*Germplasm Conservation Guidelines for Australia.* (An Introduction to the Principles and practices for seed and germplasm banking of Australian species). Produced by the Australian Network for Plant Conservation Germplasm Working Group. 1997. Australian Network for Plant Conservation.

*Guidelines for the Translocation of Threatened Plants in Australia.* Produced by the Australian Network for Plant Conservation Translocation Working Group. 1997. Australian Network for Plant Conservation.

To obtain these and other ANPC publications, contact the ANPC National Office, or use the order form on the back of the membership form.



## ANPC Inc. Executive Committee Meetings Summary

*Paul Scannell, Secretary, ANPC*

The first ANPC Inc. full Committee meeting was conducted by teleconference, on 13th May. Nita Lester was warmly welcomed as the new Treasurer of the ANPC, and her extensive experience will be a great bonus to our network.

The major portion of our 98/99 NHT funding has been received, and this will enable long term planning to commence.

The Australian National Botanic Gardens (ANBG) continues to be very generous in its support. The Assistant Coordinator's position, is essential for the publication of *Danthonia* and has been extended once again. A letter of thanks has been sent to John Hicks, Acting Director, and a gold sponsors award will be presented at the conference.

Being a national network, logistics are enormous, so strategies were discussed for holding executive, general and subcommittee meetings. Teleconference and email updates will be the basis of these meetings and an annual 1 to 2 day, face-to-face get together may be sufficient. When members gather themselves together from around Australia, the opportunity will be taken to convene meetings.

A financial planning committee is being formed and will tackle preparing a business plan to ensure the ongoing operation of the ANPC.

The Conference Program Committee has met several times and planning is going well for the conference in November, at the Lake Hume Resort, Albury/Wodonga.

Master workshops, the conservation techniques course, existing germplasm and translocation guidelines and the possibility of in-situ guidelines were also discussed, and the next two years look like being very productive.

### Volunteer of the Year Awards

The annual Canberra Volunteer of the Year Awards this year recognised the services of Geoff and Gwyn Clarke in the Environment Category. Together they have given more than 30 years of service to the preservation, propagation and education of Australian native plants through their association with the Society for Growing Australian Plants (SGAP). Geoff also helped with the incorporation of the ANPC last year. The ANPC congratulates Geoff and Gwyn on their award and their contribution to plant conservation over the years.

## Professor Henry Nix steps down as Director of CRES

Professor Nix was born in Ipswich, Queensland in 1937. He was educated in Ipswich, at the Queensland Agricultural College, where he gained a Diploma in Agriculture with first class honours in 1956, and the University of Queensland, where he graduated in 1960 with a Bachelor of Agricultural Science.

From 1961 to 1986 he was employed with the CSIRO, and his main scientific work may be summarised as having a role in the development of:

- land inventory and evaluation methodology;
  - simulation models of crop, pasture and forest systems;
  - agricultural research strategies; and
  - ecoclimatology,
- and having provided:
- critical reassessment of natural land resource base;
  - contributions to ecological research; and
  - data for current research.

In 1986 he was appointed Professor and Director of the Centre for Resource and Environmental Studies (CRES) at the Australian National University, Canberra. CRES is an interdisciplinary research centre that focuses on resource and environmental policy issues of national and global significance. The Centre's central



Henry Nix.

underlying theme is its concern with sustainability of human life support systems. This involves renewable and non-renewable resources and their development, use and conservation by individuals, institutions and governments.

In April of this year Henry completed his second term as the Director of CRES, after a total of 12 years in the position. He remains in CRES as a Professor with responsibility for research and postgraduate training.

Henry has been Chair of the ANPC Advisory Committee since its inception in 1992, and is also a member of the new ANPC Inc. Committee.

## Draft Threat Abatement Plan for Dieback caused by the root-rot fungus, *Phytophthora cinnamomi*

Dieback caused by the root-rot fungus *Phytophthora cinnamomi* is listed as a 'key threatening process' in Schedule 3 to the Commonwealth's *Endangered Species Protection Act 1992*. The Act requires that a nationally coordinated threat abatement plan be prepared and implemented to manage the impact of phytophthora dieback on Australian ecosystems. A Draft Plan has now been prepared for public comment. Specific actions in the Plan describe the measures to be used to mitigate the harm caused by the fungus.

The draft Threat Abatement Plan will be on exhibition for public comment for 3 months from the middle of June. Copies of the plan will be available from:

Community Information Unit, Environment Australia, GPO Box 787, Canberra, ACT 2601.

The Community Information Unit can be contacted by phone on 1800 803 772, 9am – 4pm Monday to Friday or by email: [ciu@ea.gov.au](mailto:ciu@ea.gov.au).

It is also intended that the Plan will be placed on the internet (<http://www.environment.gov.au/>).

## ARAZPA/ASZK 1999 Conference — 'Getting the Message Across': Communication for Conservation

John Arnott, Curator of Horticulture, Melbourne Zoo

The Alice Springs Desert Park (ASDP) hosted the joint Australasian Regional Association of Zoological Parks and Aquaria (ARAZPA)/Australasian Society of Zoo Keeping (ASZK) Conference in March 1999.

The ASDP from the outset has established itself as a multi-dimensional facility in terms of zoology, botany and interpretation. It was therefore significant but not altogether surprising that a mixed and diverse agenda of papers and workshops was prepared with a strong botanic theme running alongside the more traditional zoological/husbandry/zoo management topic.

240 delegates attended the forum from a range of institutions and organisations. A significant number of botanic garden representatives attended.

Workshop topics of interest to the ANPC included:

- Plant Conservation — a role for zoos?
- Exhibit Design — the place of plants
- Collections Planning and Maintenance Programming

These three workshops were all well attended with over 80 participants across the three sessions. Indeed the exhibit design workshop achieved the highest attendance of all 35 workshops set down for the duration of the conference. The success of these workshops indicated that zoos, wildlife parks and kindred organisations indeed facilitate an important and vibrant role within the plant conservation and botanical network. The importance of botany and botanic pursuits is becoming increasingly important to the zoo industry.

Relevant paper presentations included *Plants are wildlife too*, from Melbourne Zoo, which provided an overview of the zoo horticulture scene and the implications of immersion exhibits and plant conservation for zoos. Jeanette Mill discussed the ANPC and the need for plant conservation to be approached in an integrated manner. Mark Richardson, filling in for Peter

Latz, presented *The right things in the right places*, the approach to botanic planning at the ASDP. An innovative approach to threatened flora display was presented by Perth Zoo with the *Roadsides reserves display*. And amongst other horticulture/botany papers, Kingsley Dixon and Mark Richardson collaborated with a paper entitled *Tin shed to Taj Mahal*, reflecting on the approach undertaken in establishing research facilities in partnership with universities and private industries.

ARAZPA/ASZK also provides the industry an opportunity for special interest groups, such as environmental educators and taxon advisory groups to meet and workshop. Again, an Alice Springs breakthrough was the first meeting and subsequent formation of a Taxon Advisory Group for Invertebrates, to discuss issues of invertebrate conservation, collections and display and the role of invertebrates in zoos and wildlife parks.



Visitors are immersed in an outstanding bushland experience at Melbourne Zoo. Photo by Jeanette Mill.

'Getting the message across' was all about communication. Communication with regard to indigenous perspectives, environmental education, animal husbandry, marketing, collections management, veterinary science, and zoological horticulture/botany.

If the conference organisers had intended to put botany on the agenda, introduce invertebrates to the fold and touch people with a little part of central Australia, they were indeed successful and should be congratulated for hosting such a successful forum.

I personally take out of Alice Springs a sense of momentum with regard to botany and botanic issues and encourage an ongoing active botanic involvement in future ARAZPA/ASZK forums.

John Arnott can be contacted on  
Ph: (03) 9285 9439, Fax: (03) 9285 9370 or  
email: [jarnott@zoo.org.au](mailto:jarnott@zoo.org.au)

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## Regional Botanic Gardens Education/Presentation Workshop

*Paul Scannell, Albury Botanic Gardens*

The Council of Heads of Australian Botanic Gardens provided Staff Career Development Grants last year. One of the successful applications was to send 16 staff, from Regional Botanic Gardens, from Victoria and NSW, to the Australian National Botanic Gardens (ANBG) in Canberra, from 19–23 April 1999, for an intensive education and presentation course.

The five day course was designed to identify and investigate local, environmental problems that threaten conservation of biodiversity and discover how Regional Botanic Gardens and their staff can address these issues with limited resources.

Chris Perrers of the ANBG Education Centre spent many hours developing the program and the presenters were sensational. Topics covered were salinity and degradation, rare and threatened plants (this session was presented and conducted by the ANPC) and environmental weeds. Background and solutions were investigated in workshops and presentation techniques developed for tours, information sessions, media and signage.

The Friends of the ANBG were fantastic, allowing us to nitpick two of their best guides' tours of the Gardens, for content and presentation (which they passed with flying colours!), and their generous gift of vouchers were very much appreciated (and very quickly spent in the Gardens shop).

The entire five days at the ANBG were highly stimulating and motivational. Thanks go to the Council of Heads of Australian Botanic Gardens, the staff and Friends of the ANBG, all the presenters and especially Chris Perrers, for a great experience. Well done!



Friends of the ANBG guide, Norman Morrison, giving a tour of the Gardens.  
Photo by Sue Herd.

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## Two Wells Lewiston and District Landcare Group, SA

*Pat Wake, Coordinator, Two Wells Lewiston and District Landcare Group*

The Two Wells Lewiston and District Landcare Group was established in July 1998. We are only a small group that concentrates on collecting seed and material from plants that are locally rare or endangered. We have had some success with *Hakea muelleriana* and *Allocasuarina muelleriana*, which are few and far between in the District Council of Mallala. We are using a 'safe haven', close to where our volunteers live, with the hope of extending the life of the genetic pool of these species. Even though our group is only small, we are committed in our venture. We are currently working on developing an Aboriginal Bush

Tucker Trail in Two Wells that will include as many of our locally threatened plants as possible.

We had a large portion of our seed source destroyed (legally) late last year. This type of clearing is all too common still and it is very frustrating when we are unable to do anything. We have attempted to remove some of the plants that were not destroyed, only time will tell if we are successful.

Pat Wake can be contacted by phone on (08) 85243358 (pm),  
or email: patw@twpo.com.au



## Publications

*Conservation Biology for the Australian Environment*. Burgman, M.A. and Lindenmayer, D.B. (1998). Surrey Beatty & Sons: Chipping Norton, NSW.

Provides an introduction to the principles of conservation biology with a focus on the Australian biota, using mostly Australian examples to illustrate key points. It also provides information on some of the quantitative methods and analytical and statistical procedures that are important in detecting and solving conservation problems.

Available from Surrey Beatty & Sons, 43 Rickard Road, Chipping North, NSW, Australia 2170, for Aud\$45 plus postage within Australia of \$8, or overseas \$21.

*Flora of Australia: Volume 1 — Introduction*. (2nd edition) (1999).

Available from CSIRO Publishing, PO Box 1139, Collingwood, 3066.  
Free call: 1800 645 051,  
or email: sales@publish.csiro.au

*A practical guide to Soil Lichens and Bryophytes of Australia's Dry Country*. Eldridge, D. & Merrin, T. (1997).

Copies are available from the Information Centre, Department of Land and Water Conservation, GPO Box 39 (23–33 Bridge Street), Sydney NSW 2001, for \$14.95 plus \$1.50 postage.  
Tel: (02) 9228 6415, Fax: (02) 9228 6458

*CSIRO Publishing*

See their full list of titles at:  
[www.publish.csiro.au](http://www.publish.csiro.au)

## Electronic Addresses

*Albury Botanic Gardens*

<http://www.albury.net.au/~accparks/index.html>

*Perception of Native Vegetation in Rural Landscapes*

<http://www.landfood.unimelb.edu.au/research/natveg/index.html>

*CRC for Weed Management Systems*

<http://www.waite.adelaide.edu.au/CRCWMS/>  
The CRC for Weed Management Systems is committed to increasing the sustainability of agriculture and protecting the natural environment by developing ecologically sound, cost effective weed management systems.

*Cooperative Centre for Tropical Pest Management*

<http://www.ctpm.uq.edu.au/>

*SABONET (Southern African Botanical Diversity Network)*

<http://www.nbi.ac.za/systematics.htm>

The SABONET project is aimed at upgrading and strengthening the level of botanical expertise available in the African subcontinent. The project covers all the countries of southern Africa, namely Angola, Zambia, Malawi, Mozambique, Namibia, Botswana, Zimbabwe, Swaziland, Lesotho and South Africa.

*Trees For Life*

<http://www.treesforlife.org.au/index.html>

Trees For Life is a non-profit community group dedicated to revegetation and the protection of threatened and valuable bushland in South Australia.

## Conferences

*SA Community Landcare Conference*

**12–13 July 1999**, Victor Harbour

Contact: Conference Secretary, PO Box 51, Highgate, SA 5063. Tel: 08 8303 9347

*XVI International Botanical Congress*

**1–7 August 1999**, St Louis, Missouri, USA

The purpose of this congress is to provide a forum for the presentation and discussion of the latest advances in the plant sciences among botanists worldwide.

For information contact Peter C. Hoach, Secretary General, XVI IBC, Missouri Botanical Garden, PO Box 299, St Louis, MO 63166-0299 USA.

Tel: +1 314 577 5175, Fax: +1 314 577 9589

email: [ibc16@motob.org](mailto:ibc16@motob.org)

Internet: <http://www.ibc99.org>

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*NSW Regional Botanic Gardens: Making a difference*

**6–7 August 1999:** Wagga Wagga, NSW  
Inquiries: Kerry Geale Ph: (02) 6926 9601,  
or Rob Smith Ph: (02) 4567 2154

*Bushcare Conference: Balancing Conservation and Production in Grassy Landscapes*

**19–21 August 1999:** Clare, South Australia  
Contact: Intercomm Event Coordination,  
Ph: (08) 8645 0199, Fax: (08) 8644 1775,  
email: nicolson@w130.aone.net.au

*Threatened Species: Active Bushcare Conference*

**7–8 September 1999,** Brisbane Botanic Gardens  
Mt Coot-tha

The conference is intended to increase awareness of rare plants in Queensland and to present the information on best practice available in government departments and universities, to members of the community who may be able to get funding to do onground activities.

Contact: Dr Rosemary Murray  
Tel: (07) 3403 2535, email: vsomg@bit.net.au

*The Twelfth Australian Weeds Conference 1999*

**12–16th September 1999,** Wrest Point Hotel  
Casino, Hobart.

On the eve of the new century, conference delegates will be able to take a reflective look at what we have done in weed management over the last 100 years, both good and bad, and use this information to focus on where we are going after 2000.

Further information is available from  
Conference Design. Fax: 03 6224 3774,  
email: mail@cdesign.com.au

*Strategies for Survival: Ex Situ Plant Conservation Symposium*

**29 September–1 October,** Chicago, USA

Registration enquiries to:  
Chicago Botanic Garden, Education Registrar,  
1000 Lake Cook Rd., Glencoe, IL 60022, USA.  
Ph: (847) 835 8261 Fax: (847) 835 6874

*National Conference of Volunteer Guides in Botanic Gardens*

**5–8 October 1999,** Mount Annan Botanic Garden,  
NSW

General enquiries to Jean Winton  
Ph: (02) 4889 8729  
Registration enquiries to Vivian Berney,  
Ph/Fax: (02) 9959 4489

*BGCI 4th International Congress on Education in Botanical Gardens*

**8–12 November 1999,** Thiruvananthapuram,  
Kerala, India.

Themes will include Education for Sustainability; Beyond the Limits — Rural and Community Outreach; Development Education and Environmental Ethics; Teaching our Traditions — Medicinal Plants and Ethnobotany and; New Trends in Science Education.

For further information contact BGCI,  
Descanso House, 199 Kew Road, Richmond,  
Surrey TW9 3BW.

Tel: +44 0 181 332 5198, or  
Fax: +44 0 181 332 5197

## CHAH Technicians Workshop

*Racheal Wakefield, National Herbarium of NSW*

From April 19–25, the Council of Heads of Australian Herbaria (CHAH) ran a cryptogamic technicians workshop in Canberra. The venue was the Australian National Botanic Gardens and the workshop was run by the Australian National Herbarium. Technicians from Victoria, NSW, the ACT and New Zealand were treated to a feast of lectures and herbarium instruction from leading cryptogamic botanists of Australia. It was a very busy and mentally straining week but incredibly rewarding.

The specific groups looked at were: hepatics (Elizabeth Brown), lichens (Jack Elix and Patrick McCarthy), mosses (Heiner Streimann), freshwater fungi (Ken Thomas), freshwater algae (Tim Entwisle) and macrofungi (Tom May and Cheryl Grgurinovic). Also, Helen Hewson discussed the state of cryptogamic botany; David Eldridge, cryptogams in relation to soil crust ecology; and Heino Lepp, methods of photographing cryptogams. There were a number of guest lecturers who spoke of their research projects. The week was finished off with field trips to Tidbinbilla Nature Reserve on Saturday, and Captains Flat on Sunday. A special mention must be made of Graham Bell who was with us for most of the week including the field trips. He was most informative and willing to help wherever needed. Also to Judith Curnow who was there the whole week and organised much of the workshop.

Of almost as much importance to the technicians as the information on cryptogams was the liaison between institutions that occurred. We were all able to swap ideas on how

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different institutions functioned. This was most rewarding. There were even some ideas swapped on how to control botanists, which was invaluable. For me it was a great week of learning and socialising with other like-minded people. It was a pity that other technicians from institutions further afield could not come, but I

recommend that they all try to attend the next workshop whenever and wherever it may be. It was well worth the trip.

Rachael Wakefield can be contacted on Ph: (02) 9231 8010 or by email: rachael\_wakefield@rbgsyd.gov.au

## New ANZECC List for Threatened Australian Flora – May 1999

During 1998 the Australian and New Zealand Environment and Conservation Council's (ANZECC) Endangered Flora Network carried out a review of the *Threatened Australian Flora List 1997*, and the resulting amendments were formally endorsed by the ANZECC Standing Committee for Conservation on 7 May 1999.



The *Threatened Australian Flora List 1999* now covers a total of 1235 listed taxa, 64 in the Presumed Extinct Category, 519 are listed as Endangered and 652 as Vulnerable.

As a comparison, the *Threatened Australian Flora List 1997* contained information on a total of 1141 taxa, of which 68 were listed as Presumed Extinct, 372 as Endangered and 701 as Vulnerable.

Hard copies are available on request from the Threatened Species & Communities Section, Environment Australia, Biodiversity Group, The Administrative Building, King Edward Terrace, Barton, ACT 2601 (GPO Box 787, Canberra ACT 2601).

Ph: 02 6274 2283, Fax: 02 6274 2214.

The List will also be available shortly via the internet — a document of the complete list and separate lists of Endangered, Vulnerable and Presumed Extinct taxa respectively.

The Internet address is:

<http://www.biodiversity.environment.gov.au/plants/threaten/index.htm>

## National Threatened Species Day

Tuesday 7 September 1999

In each State and Territory, the Threatened Species Network (TSN) will be holding conservation events and activities, which you can participate in to help conserve Australia's threatened ecological communities, plants, animals and their habitats.



Threatened  
Species  
Network

Contact your State Coordinator or the TSN website for more information:

SA: Vicki-jo Russell (08) 8223 5155  
QLD: Mike Gregory (07) 3221 0573  
NSW: Claire Carlton (02) 9281 5515  
NT: Colleen O'Malley (08) 8952 1541  
VIC: Felicity Faris (03) 9650 8296  
TAS: Peter McGlone (03) 6234 3552  
WA: Sandra McKenzie (08) 9387 6444

Information on threatened species is available at the website:

<http://www.nccnsw.org.au/member/tsn>

## On the brink!

*On the brink!* — newsletter of the Endangered Species Program, Biodiversity Group, Environment Australia.

Copies of the newsletter are available on the Internet at:

<http://www.biodiversity.environment.gov.au/plants/threaten/education/newsletters/index.htm>

Or you can be listed on the mailing list by writing to:

On the brink!

Endangered Species Program

Biodiversity Group, Environment Australia

GPO Box 787, Canberra ACT 2601

Email: [esp@ea.gov.au](mailto:esp@ea.gov.au)

## Regional Groups

### *Arid Zone Regional Meeting*

*Jeanette Mill*

Olive Pink Botanic Gardens, Alice Springs, was the setting for a meeting of local members and visitors in town for the conference of the Australasian Regional Association of Zoological Parks and Aquaria (ARAZPA) on March 25th. At the meeting members had an opportunity to meet ANPC President, Kingsley Dixon, and hear about ANPC's recent developments. Strategies for enhancing plant conservation actions and expertise in the Arid Zone were discussed. The main focus was on the crucial role that ANPC plays in training practitioners in conservation techniques, and how increasingly important this is with the growing emphasis on community-driven conservation actions.

Thank you to Clarry, Connie and Frances at Olive Pink Botanic Gardens for providing such a wonderful venue for the meeting.

### *NSW Western Slopes Region*

For information about the group, please contact Coordinator Bob Waters, Burrendong Arboretum, Mumbil NSW 2820.

Phone/Fax: 02 6846 7454

### *Sydney Region*

*Tracey Armstrong, Mount Annan Botanic Gardens*

At a meeting on the 27th March, Claire Carlton, the NSW Coordinator of the Threatened Species Network, gave a very informative talk on the Community Biodiversity Survey Manual which she developed as a joint project between the National Parks Association and the NSW National Parks and Wildlife Service (NPWS).

The Manual is an accumulation of information gathered from scientific reports, manuals and experienced people that provides a framework for community groups to collect standardised data on their project. This standardisation makes the data more reliable and acceptable and will ensure data is compatible with other surveys. Its use can be advantageous for community groups to justify funding from the government.

At present, the Manual is only designed for terrestrial surveys including birds, plants, reptiles, mammals, insects and amphibians, but a second edition is in the pipeline, which will be more user friendly and hopefully contain survey techniques for aquatic environments.

The Manual contains directions for two types of surveys. The preliminary survey is very basic and anyone can use it. This survey involves no collecting of specimens so that a collecting licence is not required.

The detailed survey is designed to be run with scientific support. The team leaders must be licensed with NPWS, but it is also very desirable that they be good instructors and communicators so that there is a skill transfer between each team leader and their team of 3-4 volunteers. What type of survey depends on the knowledge and expertise of the team leader. For example, if the team leader is a botanist, then a botanical survey can be conducted. After 3-4 days surveying, the data is collated and written up and the result is an accurate picture of the survey site.

There are a number of criteria which can be used to determine the survey site including new reserve proposals, areas under threat, or areas which have never been properly surveyed.

Not only does the Manual provide survey methods, it also outlines the day to day management of the base camp, including organisation, health and hygiene issues, costing, and even recipes. At a cost of \$10/person/day you too can run an efficient and effective survey.

Perhaps some ANPC members might be interested in doing a joint survey with other groups, for example National Parks Association, Birds Australia or the Field Naturalists Club. Claire has said that she is willing to give advice to anyone wishing to organise a survey and her contact details are:

Claire Carlton, NSW Coordinator, Threatened Species Network, PO Box 528, Sydney 2001.  
Ph: 02 9281 5515, Fax: 02 9281 1060,  
or email: [ntsnnsw@peg.apc.org](mailto:ntsnnsw@peg.apc.org)

Copies of the Manual are available at the National Parks Association office at Level 4/83-87 Castlereagh Street for \$25. Their phone number is 02 9233 4660.

### *MARROOTA-CATTAL AREA WEEKEND*

At several recent meetings members have expressed an interest in learning about the proposed Marroota National Park in



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north-western Sydney. The Park would conserve the Maroota Sands Swamp Forest, which has been listed as an Endangered Ecological Community under the *NSW Threatened Species Conservation Act 1995*.

The Cattai Catchment Management Committee has organised a twelve month project titled 'Ecology of the Maroota Sandmass and Environs', funded by the Natural Heritage Trust, which conducts studies throughout the Maroota each season. The results of these studies are offered to the community through a series of educational weekends, and the third weekend is coming up on the 17th and 18th of July.

Participants will be offered a variety of workshops including field survey methodologies, soils, flora, fauna, night spotting, colonial history, environmental impacts of agriculture; and water catchment quality. Plus, for \$10 per head, all meals will be catered. You can come for one session, come for the whole day, or even camp overnight. So if you want to find out all about Maroota, Catchment Management Committees, and meet with other interested people, give Sheryl a call at Cattai Catchment Centre on (02) 9651 2170.

#### *Tasmanian Region*

*Andrew Smith, Coordinator, Parks and Wildlife Service, Tasmania*

### **I**ntroduction of Endangered Plant Species into Community Gardens

*A joint project led by the Friends of the Royal Tasmanian Botanical Gardens, in cooperation with The Royal Tasmanian Botanical Gardens, the Parks and Wildlife Service and WildCARE Incorporated (Botanical Guardians). Funded by the Threatened Species Network Community Grants Program.*

There are a number of our threatened plant species that have few populations and/or are few in number and there is no representation apart from in the wild. These are at high risk of extinction and, as an insurance against this possibility, representative holdings of these species need to be kept outside of the wild populations.

In the past, recovery plans have undertaken to establish ex situ populations. These have proved to be of limited success for a number of reasons. The main reason is the lack of a robust and perpetual system to ensure that these holdings are maintained in the long term even in the

event of establishment success. Additionally, establishment and maintenance of ex situ populations can be expensive. There are many species for which this approach is not a viable option. It is these species for which we need to set up a perpetual and robust ex situ planting system to maintain plants outside of wild populations to ensure these species do not become extinct.

The aim of this project is to distribute representative samples from the wild populations of endangered plants for holding in private gardens. A system will be set up to collect and retrieve relevant information on the origin of plants and establishment success in these gardens. Each garden will hold a small subsample of the variation occurring in the wild so that in totality there is a broad representative sample of the total population held in private gardens from which material can be collected for conservation actions should populations in the wild decline. The intention is to have this project build on and integrate with existing and future recovery plans.

The Friends of the Gardens with the support of the Royal Tasmanian Botanical Gardens and in partnership with the Threatened Species Unit and WildCARE Incorporated, will undertake to collect, label, propagate and distribute a number of the most endangered of our species, initially including *Phebalium daviesii*, *Epacris stuartii*, *Tetralochea gunnii*, *Argentipallium spiciferi*, *Epacris barbata*, *Epacris limbata* and threatened grassland species including, *Danthonia popinensis*, *Ranunculus prasinus*, *Colobanthus curtisiae* and *Leucochrysum albicans* var. *tricolor*.

It is envisaged that plants will be distributed in the form of conservation planting packs consisting of up to three plants labelled as to their origin (clone or seedling number). The planting of more than one individual in a garden will encourage production of seed. Included in the pack will be supporting information for the grower which will include information on threats to the species, growing information, unique identifier numbers for the plants, and forms to be filled out before the packs are taken which give the growers name, address at which planting will take place and contact details. This information will have a twofold purpose, firstly to help the Friends and the Threatened Species Unit retrieve relevant information and plant material if needed, and as a way to educate people about threatened

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species issues and what is involved in conserving highly threatened species. WildCARE members will be involved in this system and will be called on to help to assemble and distribute the planting packs. The Threatened Species Unit will be the repository for information regarding the origin and location of the plantings and will also monitor and review the system in collaboration with the Friends so that the retrieval of plant material and information about the plants is effective. It is hoped to distribute 150 planting packs per species.

It is intended that there will be a small charge for the packs for two reasons, firstly, cost recovery for the Friends to be used to help perpetuate the system in the long term and secondly to ensure commitment from the growers. The packs will be developed and promoted by the group and distributed through the Friends, WildCARE Incorporated and through other community groups.

The Friends will undertake to contact growers to monitor the establishment success of plants and detail conditions that the plants appear to like or dislike. Additional information such as seed set can also be collected. Initial monitoring will occur approximately a year after distribution of the packs and will help to determine the feasibility of retrieving plant material should this be required.

The project has commenced to a certain degree with the distribution by the Threatened Species Unit of planting packs for *Phebalium daviesii*, each with plants of three clones. The packs have proved popular and over 100 have been distributed with demand outstripping supply. Growers are eagerly awaiting release of packs for other endangered species. The Unit now has stock plants available for *Epacris stuartii*, *Tetratheca gunnii* and *Argentipallium spiceri*.

For further information contact Andrew Smith on phone: 03 6233 2185, fax: 03 6233 8308, or email: andrews@dpiwe.tas.gov.au

*NSW South West Slopes Region*

*Paul Scannell, Albury Botanic Gardens*

**Learning from Farmers:** The 'Learning from Farmers Project' has had a fantastic response from farmers managing native vegetation in the Murray Catchment. At least 10 will be selected as learning sites for the farmers to demonstrate the value of managing native vegetation for productivity in their local communities.

These sites contain remnants of scarce vegetation communities and have great possibilities as education and conservation resources. Signage and

assistance will be provided by the organising committee of the Nature Conservation Working Group of the Murray Catchment Management Committee.

**Threatened Species Recovery Plan:** The *Caladenia concolor* (Crimson Spider Orchid) Recovery Plan has reached first draft stage. A meeting in Queanbeyan at the start of June will begin editing, identifying and listing hazards and threats and sorting out management guidelines.

The Regional Bushfire Management Draft Plan has also been tabled, and controlled burnoffs and high risk zones are high on the agenda. Treatment of threatened species habitats, timing of burnoffs, confidentiality of location of threatened species and best management practice of surrounding habitat are all to be addressed by a local committee, including members of the Threatened Species Recovery Team.

**1999 ANPC Inc. Conference, Albury/Wodonga:** The Lake Hume Resort has been selected as the venue for the 1999 ANPC Conference, 25-29th November. It offers a wide range of accommodation, from camping and hostels to cabins and motel rooms. This will be a great chance for people from all areas of plant conservation to get together and gain some real positives and make great contacts.

This promises to be a major event for plant conservation in our region and everybody is urged to put the time aside to attend. It will certainly assist in a fully coordinated approach to flora and fauna conservation in our catchment.

Any inquiries, please contact us at the Albury Botanic Gardens office on ph: 02 6023 8241, fax (02) 6041 6527 email: accgardn@albury.net.au Website: www.albury.net.au/~accparks

## Name Change

The Society for Growing Australian Plants is now the 'Australian Plants Society' in New South Wales and 'Australian Plants Society (SGAP Vic) Inc.' in Victoria.

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# The Australian Network For Plant Conservation Inc. Membership List

The date in brackets indicates that the member has joined or renewed for that year. Addresses and names of contact persons are available from the National Office.

Note: memberships are valid for the calander year.

## Corporate Members

ACT Parks & Cons. Service (1998)  
Adelaide Botanic Gardens (1999)  
Albury Botanic Gardens, NSW (2000)  
Alcoa of Australia Ltd, WA (1999)  
Australian National Botanic Gardens (1999)  
Aust Tree Seed Centre, CSIRO (1999)  
Biodiversity Group, Environment Australia (1999)  
Brisbane Botanic Gardens, Qld (1998)  
Caloundra City Council, Qld (1998)  
Centre for Plant Biodiv. Rsch, ACT (1999)  
Centre for Plant Conservation Genetics, NSW (1999)  
Coffs Harbour City Council, NSW (2000)  
Conservation & Land Management, WA (1998)  
Council of the City of Orange, NSW (1998)  
CSIRO Publishing (1999)  
Dept. of Defence, ACT (1998)  
Environment ACT (1999)  
Eurobodalla Bot Garden, NSW (1999)  
Flecker Botanic Gardens, Qld (1999)  
Forestry Tasmania (1997)  
Gladstone Tondoon Botanic Garden, Qld (1998)  
Kings Park and Botanic Gardens, WA (1997)  
Logan City Council, Qld (1998)  
Maroochy Shire Council, Qld (1998)  
Minerals Council of Aust, ACT (1999)  
Mt Tomah Botanic Garden, NSW (1998)  
Norfolk Island Botanic Garden (1999)  
North Forest Products, Tas (1998)  
NSW National Parks & Wildlife Service (1999)  
Olympic Coord. Authority, NSW (1998)  
Pacific Power, NSW (1998)  
Parks and Wildlife Commission, NT (1999)  
Parks Australia — North, Christmas Island (1999)  
Qld Dept. Environment Cent. Coast (1999)  
Queensland Herbarium (1998)  
Randwick City Council, NSW (1998)  
Redland Shire Council, Qld (1999)  
RGC Mineral Sands, WA (1998)  
Royal Botanic Gardens, Melbourne, Vic (1999)  
Royal Botanic Gardens, Sydney, NSW (1999)  
Royal Tasmanian Botanical Gardens (1999)  
Standing Committee on Forestry, ACT (1999)  
Strathfield Municipal Council, NSW (1999)  
Tas. Dept. Primary Industries, Water & Environment (1999)  
Townsville City Council, Qld (1999)  
Wollongong Botanic Gardens (1999)  
Zoological Parks Board of NSW (1999)  
Zoological Board of Victoria (1999)

## International Associates

Auckland Plant Collections Network, NZ  
Botanic Gardens Conservation Intl, UK  
Botanical Research Institute of Texas  
Botanischer Garten und Botanisches, Germany  
David Brackett, SSC, IUCN  
Canadian Botanical Conservation Network  
Center for Plant Conservation, USA  
Columbus Zoo, Ohio, USA (1998)  
Conservatoire et Jardin Botaniques, Switzerland  
Don Falk, USA  
Darren Crayne, Florida, USA (1999)  
Georgia Endangered Plant Stewardship Network, USA  
David Given, NZ (1997)  
Craig Hilton-Taylor, UK  
Honiara Botanic Gardens, Solomon Islands  
Indian Society for Conservation Biology  
Indonesian Network for Plant Conservation  
Clive Jermy  
Kebun Raya Indonesia  
Noelline Kroon, South Africa (1998)  
Missouri Bot. Gardens Library (1999)  
Dr Neil Mitchell, NZ (1999)  
Suresh Narayana, India  
National Botanical Institute, South Africa  
Jeanine Pfeiffer, USA  
PlantNet, UK  
Rare Plant Consortium, Canada  
Royal Botanic Gardens, Kew, UK (1999)  
SABONET, South Africa  
Society for Ecological Restoration, USA, (1998)  
Pritpal Soorae, IUCN/SSC, Kenya  
Mark Stanley-Price, IUCN/SSC, Kenya  
Dr I Wayan Sumantera, Indonesia  
Suva Botanical Gardens, Fiji  
Roy Taylor, USA (1998)  
Andrew Townsend, Dept. Cons., NZ (1998)  
Vailima Botanic Gardens, Western Samoa  
Wellington Plant Conservation Network  
Mohamed Zackeriya, Sri Lanka

## Other Organisations

ARAZPA (1999)  
Assn. of Soc. for Growing Aust Plants (1998)  
Australian Arid Land Botanic Garden, SA (1999)  
Aust Assn. of Bush Regenerators (1998)  
Aust. Inland Botanic Gardens, Vic (1997)  
Aust. Plants Society Maroondah, Vic (1999)  
Aust. Plants Society Newcastle Group Inc. (2000)  
Aust. Plants Society Central West Group (1999)  
Aust. Plants Society, NSW (1999)

Aust. Plants Society South West Slopes, NSW (1999)  
Aust. Trust for Conservation Volunteers (1997)  
Brunswick Valley Heritage Park, NSW (1998)  
Burnley College, Vic (1999)  
Burrendong Arboretum Trust, NSW (1999)  
Community Biodiversity Network (1999)  
Friends of ANBG, ACT (1999)  
Friends of Eurobodalla BG, NSW (1999)  
Friends of Grasslands, ACT (1999)  
Friends of North Coast Regional BG, NSW (1998)  
Friends of Warrandyte State Park, Vic (1998)  
Greening Australia (ACT/SENSW) (1999)  
Greening Australia Ltd (1998)  
Greening Australia (NSW) (1999)  
Greening Aust Sth West Plains, NSW (1999)  
Greening Aust Sth West Slopes, NSW (1998)  
Greening Australia (Vic) (1997)  
Hunter Region Botanic Gardens, NSW (1999)  
Indigenous Flora & Fauna Assn (1999)  
Lismore Rainforest Bot. Garden (1998)  
Merri Creek Management C'ttee, Vic (1999)  
Monarto Zool. Park, SA (1999)  
Myall Park Botanic Garden, Qld (1998)  
National Threatened Species Network (1999)  
NSW Roadside Env't. C'ttee (1999)  
Olive Pink Botanic Garden, NT (1998)  
Pangarinda Arboretum, SA (1999)  
Royal Aust Institute of Parks & Recreation (1998)  
Royal Geographical Society of Qld (1998)  
Royal Zoological Society of SA (1998)  
SGAP Blue Mtns Group, NSW (1999)  
SGAP — Canberra Region Inc. (1999)  
SGAP — Dryandra Study Group (1999)  
SGAP — Far Nth Coast Gp, NSW (1998)  
SGAP — Ipswich Branch, Qld (1998)  
SGAP — North Shore, NSW (1998)  
SGAP — Northern Group, Tas (1999)  
SGAP — North West, Tas (1998)  
SGAP — Queensland Region (1999)  
Stony Range Flora Reserve, NSW (1998)  
Tasmanian Arboretum Inc. (1999)  
Trust for Nature (Victoria) (1999)  
Understorey Network, Tasmania (1997)  
Wallum Action Group, Qld (1997)  
Wildflower Society of WA (1999)  
Wildflower Society of WA, Nth Suburbs (2000)  
Wildlife Preservation Society of Australia, NSW (1998)  
World Wide Fund for Nature Australia (1999)

## Individual Members

Gail Abbott, NSW (1998)  
Dr David Aldous, Vic (1998)  
Diane Allen, Qld (1999)

Jan Allen, NSW (1999)  
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S. Ip, NSW (1997)  
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Van Klaphake, NSW (1999)  
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Gregory Little, NSW (1999)  
Vicki Long, WA (1999)  
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Gillian McDonald, NSW (1999)  
Tein McDonald, NSW (1998)  
Lori McGarva, NSW (1997)  
Alex Mackenzie, NSW (1998)  
Jan McNicol, Qld (1998)  
Sally Madden, WA (1999)  
Bob Makinson, ACT (1999)  
David Mason, NSW (1997)  
Maria Matthes, NSW (1997)  
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Brian Mole, Vic (1999)  
Judith Moore, Vic (1999)  
Rosalind Moore, NSW (1998)  
Stephen Mueck, Vic (1999)  
Lorna Murray, Qld (1999)  
Daphne Nash, ACT (1997)  
Sharon Nash, NSW (1998)  
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Nan Nicholson, NSW (1999)  
Henry Nix, ACT (1999)  
Trudy O'Conner, SA (1999)  
Brett O'Donovan, NSW (1998)  
Peter Olde, NSW (1998)  
Samantha Olson, NSW (1998)  
Joan Overeem, NSW (1999)  
Tysiena Overeen, ACT (1999)  
Dr. Bob Parsons, Vic (1999)  
Hugh Paterson & Françoise Matter, NSW (1999)  
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Travis Peake, NSW (1998)  
Judy Peet, NSW (1997)  
Ian Perkins, NSW (1999)  
J Playford, Qld (1999)  
Robert Porter, NSW (1999)

Brian Quinn, Vic (1998)  
Peter Ray, WA (1998)  
Ruth Readford, NSW (1998)  
Phil Redpath, NSW (1999)  
Bonni Reichelt, Qld (1999)  
Mark Richardson, NT Hon. Life Member  
Lill Roberts, Vic (1999)  
Geoffrey Robertson, NSW (1998)  
Robert & Debra Robertson, ACT (1998)  
Mark Robinson, NSW (2000)  
Steve Row, NSW (1998)  
Esma Salkin, Vic (1999)  
Dr. Alison Shapcott, Qld (1998)  
Darren Shelly, NSW (1999)  
Nicholas Skelton, NSW (1999)  
Ian R Smith, Qld (1997)  
Marilyn Smith, NSW (1997)  
Diana Snape, Vic (1999)  
Fiona Spier-Ashcroft, ACT (1997)  
Marilyn Sprague, Vic (1997)  
Herbert Staubmann, Tas (1999)  
Debbie Stevenson, NSW (1998)  
John & Irene Story, Qld (1998)  
Jonathan Streat, NSW (1997)  
Joe Swartz, NSW Hon. Life Member  
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Nicki Taws, ACT (1999)  
Elaine Thomas, Vic (1999)  
Craig Thompson, NSW (1999)  
Lyn & Merle Thompson NSW (1999)  
David Tierney, NSW (1998)  
Dale Tonkinson, Vic (1999)  
Kylie Treble, Vic (1999)  
Bindi Vanzella, NSW (1998)  
Brenda Venton, NSW (1998)  
Dierk von Behrens, ACT (1999)  
Warner Wait, Tas (1998)  
Josephine Walker, NSW (1997)  
Robert Wallis, Vic (1999)  
Kerry Walsh, Qld (1999)  
Bruce Wannan, Qld (1999)  
Chris Ward, NSW (1997)  
Sylvia Webber, NSW (1997)  
Matt White, NSW (1997)  
John Wilkes/Ros Cornish, NSW (1999)  
Carol Williams, Tas (1999)  
Jann Williams, NSW (1999)  
Mark Williams, NSW (1999)  
J & A Willinck, NSW (1999)  
Anne-Marie Wilson, ACT (1998)  
Brigitta Wimmer, ACT (1999)  
Geoff Winning, NSW (1998)  
John Wrigley, NSW (1999)  
Martin Zierholtz, NSW (1997)  
Toivo Zoete, NSW (1999)

### *Donations Received in 1999 from:*

Ian Cox  
Bill Gale  
Elizabeth George  
Janet Gorst  
George Limburg  
Bill McDonald  
Lyn Meredith  
Henry Nix  
SGAP — Blue Mountains  
Mark Williams  
Tiovo Zoete